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Article (Accepted Version)

A Lesson from Classic British Literature

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In The Mill on a Floss,[1] George Eliot wrote "*But the immediate presence of this disgrace was so much keener an experience to Tom than the worst form of apprehension, that he felt at this moment as if his real trouble had only just begun: it was a touch on the irritated nerve compared with its spontaneous dull aching".*

The author used current understandings of physical pain symptoms as a metaphor for personal psychological suffering. Tom knew that his father had lost their property, and carried that embarrassment with him (spontaneous dull aching). In the scene, a bailiff was in the parlor to liquify assets (the touch on the irritated nerve). These descriptions will ring familiar to many patients today, but we have only recently discovered their neurobiological mechanisms.

Understanding the mechanisms should help with the diagnosis and thus treatment of radiating pain symptoms that are present in most cases of cervical and lumbar radiculopathies, repetitive motion disorders, and complex regional pain syndromes, conditions that more often than not have no sign of nerve injury.

Both sensory experiences alluded to in the quote can be explained by the effects of nerve inflammation, called neuritis. During neuritis, chemical and mechanical stimuli of the affected nerve lead to the generation of nociceptor action potentials (and pain). The presence of inflammation and constituent inflammatory mediators leads to tonic discharge,[2] predicted to be perceived as a spontaneous dull ache. Mechanical stimulation of the inflamed nerve also leads to nociceptor discharge,[3] predicted to be perceived as "a touch on the irritated nerve". It appears that the common mechanism of these axonal changes is the interference of axoplasmic transport, which is the mechanism by which sensory transductive channels are conveyed to the receptive terminals of neurons. During neuritis, the accumulation of these channels occurs on the axon, creating ectopic receptive fields.[2,4,5] Both perceptions would be felt distally to the inflamed site.

These changes form the basis for some of our nerve-related clinical tests, such as the straight leg raise. This test mechanically stimulates the sciatic nerve. Radiating pain evoked by the straight leg raise is almost certainly due to axonal mechanical sensitivity. In these patients, palpating or tapping the nerve (Tinel's test) will cause radiating symptoms as well. Including focal neuritis as a diagnostic possibility could refine the treatment approaches for many

patients with radiculopathies, repetitive motion disorders, and complex regional pain syndromes, and others who present with symptoms that are suspicious of nerve damage but who do not have definite findings upon routine examination.

References

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Declaration of Interest

There are no conflicts of interest.